WHAT IS CLAIMED IS:

1. A method for iterative derivation of a master image from a plurality of sampled images of non-identical, at least partially overlapping, regions of a scene, the master image having an output resolution greater than a maximum resolution of the sampled images, the method comprising:

(a) for each sampled image, defining:

(i) a transformation operator **F** mapping positions within the master image to corresponding positions in the sampled image,

(ii) a distortion operator **H** simulating a modulation transfer function associated with an imaging sensor from which the sampled image was generated, and

(iii) a sampling operator **D** for reducing an image from the output resolution to the resolution of the sampled image;

(b) for each sampled image, applying said transformation operator, said distortion operator and said sampling operator to a current master image hypothesis so as to generate a predicted image, and calculating a difference image having pixel values corresponding to the difference in corresponding pixel values between the sampled image and the predicted image;

(c) performing back-projection of each of said difference images to generate a correction image for the current master image hypothesis; and

(d) employing said correction images to perform a correction to the current master image hypothesis to generate a new master image hypothesis,

wherein said correction to the current master image hypothesis includes combining the correction images by deriving a weighted average of values of corresponding pixels in said correction images, the weight of each pixel in each correction image being calculated as a function of a distance as measured in the sampled image between: (i) a point in the sampled image to which the pixel in

the correction image is mapped by the transformation operator; and (ii) at least one pixel centroid proximal to said point.

2. The method of claim 1, wherein said function of a distance is derived from distortion operator **H**.

3. The method of claim 1, wherein distortion operator **H** corresponds to a combination of a modulation transfer function resulting from an optical system of the imaging sensor and a modulation transfer function resulting from a distortion generated by a sensor element array of the imaging sensor.

4. The method of claim 1, wherein distortion operator **H** corresponds to a modulation transfer function describing only a first portion of a distortion generated by the imaging sensor, the method further comprising a post-processing step of deconvoluting a final master image hypothesis to substantially correct a modulation transfer function describing a remainder of a distortion generated by the imaging sensor.

5. The method of claim 1, wherein said back projection includes employing an operator $\mathbf{H}^{bp}$ corresponding to a pseudo-inverse of distortion operator **H**, wherein $\mathbf{H}^{bp}$ approximates to an inverse of **H** at spatial frequencies below a given value and approaches zero at spatial frequencies above said given value.

6. The method of claim 1, wherein said back projection includes employing an operator $\mathbf{H}^{bp}$ corresponding to a pseudo-inverse of distortion operator **H**, wherein $\mathbf{H}^{bp}$ is chosen to substantially satisfy the condition:

$$\mathbf{H}^{bp} \times \mathbf{D}^{t} \times \mathbf{D} \times \mathbf{H} = \mathbf{I}$$

wherein:

I is the unit operator for an image of the output resolution;

D is a sampling operator for reducing an image from the output resolution to the resolution of an input image; and

$\mathbf{D}^{t}$ is an inflation operator for expanding an image from the resolution of the input image to the output resolution.

7. A method for iterative derivation of a master image from a plurality of sampled images of non-identical, at least partially overlapping, regions of a scene, the master image having an output resolution greater than a maximum resolution of the sampled images, the method comprising:

(a) for each sampled image, defining:

(i) a transformation operator **F** mapping positions within the master image to corresponding positions in the sampled image,

(ii) a distortion operator **H** simulating a distortion associated with an imaging sensor from which the sampled image was generated, and

(iii) a sampling operator **D** for reducing an image from the output resolution to the resolution of the sampled image;

(b) for each sampled image, applying said transformation operator, said distortion operator and said sampling operator to a current master image hypothesis so as to generate a predicted image, and calculating a difference image having pixel values corresponding to the difference in corresponding pixel values between the sampled image and the predicted image;

(c) performing back-projection of each of said difference images to generate a correction image for the current master image hypothesis; and

(d) employing said correction images to perform a correction to the current master image hypothesis to generate a new master image hypothesis,

wherein said back projection includes employing an operator $\mathbf{H}^{bp}$ corresponding to a pseudo-inverse of distortion operator **H**, wherein $\mathbf{H}^{bp}$ approximates to an inverse of **H** at spatial frequencies below a given value and approaches zero at spatial frequencies above said given value.

8. The method of claim 7, wherein $\mathbf{H}^{bp}$ is chosen to substantially satisfy the condition:

$$\mathbf{H}^{bp} \times \mathbf{D}^{t} \times \mathbf{D} \times \mathbf{H} = \mathbf{I}$$

wherein:

I is the unit operator for an image of the output resolution;

D is a sampling operator for reducing an image from the output resolution to the resolution of an input image; and

$\mathbf{D}^{t}$ is an inflation operator for expanding an image from the resolution of the input image to the output resolution.

9. The method of claim 7, wherein distortion operator **H** corresponds to a combination of a modulation transfer function resulting from an optical system of the imaging sensor and a modulation transfer function resulting from a distortion generated by a sensor element array of the imaging sensor.

10. The method of claim 7, wherein distortion operator **H** corresponds to a modulation transfer function describing only a first portion of a distortion generated by the imaging sensor, the method further comprising a post-processing step of deconvoluting a final master image hypothesis to substantially correct a modulation transfer function describing a remainder of a distortion generated by the imaging sensor.

11. The method of claim 7, wherein said correction to the current master image hypothesis includes combining the correction images by deriving a weighted average of values of corresponding pixels in said correction images, the weight of each pixel in each correction image being calculated as a function of a distance as measured in the sampled image between: (i) a point in the sampled image to which the pixel in the correction image is mapped by the transformation operator; and (ii) at least one pixel centroid proximal to said point.

12. The method of claim 11, wherein said function of a distance is derived from distortion operator **H**.

13. A method for iterative derivation of a master image from a plurality of sampled images of non-identical, at least partially overlapping,

regions of a scene, the master image having an output resolution greater than a maximum resolution of the sampled images, the method comprising:

(a) for each sampled image, defining:

(i) a transformation operator **F** mapping positions within the master image to corresponding positions in the sampled image,

(ii) a distortion operator **H** simulating only a first portion of a distortion generated by an imaging sensor from which the sampled image was generated, and

(iii) a sampling operator **D** for reducing an image from the output resolution to the resolution of the sampled image;

(b) for each sampled image, applying said transformation operator, said distortion operator and said sampling operator to a current master image hypothesis so as to generate a predicted image, and calculating a difference image having pixel values corresponding to the difference in corresponding pixel values between the sampled image and the predicted image;

(c) performing back-projection of each of said difference images to generate a correction image for the current master image hypothesis;

(d) employing said correction images to perform a correction to the current master image hypothesis to generate a new master image hypothesis; and

(e) after performing steps (b) through (d) at least once, deconvoluting a final master image hypothesis to substantially correct a remaining portion of a distortion generated by the imaging sensor from which the sampled image was generated.

14. The method of claim 13, wherein said correction to the current master image hypothesis includes combining the correction images by deriving a weighted average of values of corresponding pixels in said correction images, the weight of each pixel in each correction image being calculated as a function

of a distance as measured in the sampled image between: (i) a point in the sampled image to which the pixel in the correction image is mapped by the transformation operator; and (ii) at least one pixel centroid proximal to said point.

15. The method of claim 14, wherein said function of a distance is derived from distortion operator **H**.

16. The method of claim 13, wherein said back projection includes employing an operator $\mathbf{H}^{bp}$ corresponding to a pseudo-inverse of distortion operator **H**, wherein $\mathbf{H}^{bp}$ approximates to an inverse of **H** at spatial frequencies below a given value and approaches zero at spatial frequencies above said given value.

17. The method of claim 13, wherein said back projection includes employing an operator $\mathbf{H}^{bp}$ corresponding to a pseudo-inverse of distortion operator **H**, wherein $\mathbf{H}^{bp}$ is chosen to substantially satisfy the condition:

$$\mathbf{H}^{bp} \times \mathbf{D}^{t} \times \mathbf{D} \times \mathbf{H} = \mathbf{I}$$

wherein:

I is the unit operator for an image of the output resolution;

D is a sampling operator for reducing an image from the output resolution to the resolution of an input image; and

$\mathbf{D}^{t}$ is an inflation operator for expanding an image from the resolution of the input image to the output resolution.

18. A method for combining a plurality of input images relating to non-identical but at least partially overlapping regions of a scene to form an output image, the output image having an output resolution greater than a maximum resolution of the input images, the method comprising:

(a) defining a mapping between pixel locations in each input image and corresponding positions within the output image;

(b) employing said mapping and an interpolation methodology to generate from each input image an output component image at the output resolution; and

(c) combining the output component images by deriving a weighted average of values of corresponding pixels in said output component images, thereby generating the output image,

wherein the weight of each pixel in each output component image is calculated as a function of a distance between a point in the input image corresponding to the pixel position in the output component image and at least one adjacent pixel centroid in the input image.

19. The method of claim 18, wherein said function of a distance is derived from a modulation transfer function associated with an imaging sensor from which the input images were at least partially derived.

20. The method of claim 18, wherein the input images are differential images corresponding to the difference in pixel values between a sampled image and a corresponding predicted image, the predicted images being derived from a previously estimated master image hypothesis, the method further comprising employing the output image to apply a correction to the master image hypothesis.

21. The method of claim 20, wherein said function of a distance is derived from a modulation transfer function associated with an imaging sensor from which the input images were at least partially derived.

22. The method of claim 21, wherein said modulation transfer function is a modulation transfer function corresponding to the distortion generated by a sensor element array of the imaging sensor.

23. The method of claim 21, wherein said modulation transfer function is a modulation transfer function corresponding to the distortion generated by the combination of an optical system of the imaging sensor and a sensor element array of the imaging sensor.

24. The method of claim 18, wherein said interpolation methodology includes employing an operator $\mathbf{H}^{bp}$ corresponding to a pseudo-inverse of a modulation transfer function $\mathbf{H}$ associated with an imaging sensor from which the input images were at least partially derived, wherein $\mathbf{H}^{bp}$ approximates to an

inverse of **H** at spatial frequencies below a given value and approaches zero at spatial frequencies above said given value.

25. The method of claim 18, wherein said interpolation methodology includes employing an operator $\mathbf{H}^{bp}$ corresponding to a pseudo-inverse of a modulation transfer function **H** associated with an imaging sensor from which the input images were at least partially derived, wherein $\mathbf{H}^{bp}$ is chosen to substantially satisfy the condition:

$$\mathbf{H}^{bp} \times \mathbf{D}^{t} \times \mathbf{D} \times \mathbf{H} = \mathbf{I}$$

wherein:

I is the unit operator for an image of the output resolution;

D is a sampling operator for reducing an image from the output resolution to the resolution of an input image; and

$\mathbf{D}^{t}$ is an inflation operator for expanding an image from the resolution of the input image to the output resolution.